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AN INVESTIGATION INTO PURE GROUPS--THEIR CHARACTERISTICS AND OPPORTUNITIES.

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DIFFERENCES IN ATTITUDES BETWEEN ADVANTAGED AND DISADVANTAGED STUDENTS, AND DIFFERENCES IN ATTITUDES BETWEEN INCONSISTENT STUDENTS AND THEIR ASSOCIATED MAJORITY GROUPS WERE EXPLORED. FOR THE PURPOSE OF THIS STUDY, THE INCONSISTENT STUDENT WAS DEFINED AS EITHER A STUDENT FROM AN ADVANTAGED BACKGROUND WHO WAS UNSUCCESSFUL IN SCHOOL, OR A STUDENT FROM A DISADVANTAGED BACKGROUND WHO WAS SUCCESSFUL IN SCHOOL. BOTH INCONSISTENT AND CONSISTENT STUDENTS WERE CONSIDERED "PURE" TYPES AND DIFFERENTIATED ACCORDING TO CERTAIN CRITERION CHARACTERISTICS. SIX HUNDRED AND SEVENTY-EIGHT 13-YEAR-OLDS FROM THE UNITED STATES AND 10 OTHER COUNTRIES WERE COMPARED. THE GENERAL AND SUBJECT-RELATED ATTITUDES OF THE INCONSISTENT STUDENTS WERE FOUND TO DIFFER FROM THOSE OF THEIR ASSOCIATED MAJORITY GROUPS. THE FINDINGS DEMONSTRATED THAT ATTITUDES, HOME BACKGROUND, AND SCHOOL PERFORMANCE ARE INTERDEPENDENT. UNSUCCESSFUL STUDENTS HAD NOT BEEN GIVEN THE OPPORTUNITIES AFFORDED THE SUCCESSFUL STUDENTS, DISADVANTAGED STUDENTS HAD NOT BEEN GIVEN THE OPPORTUNITIES ENJOYED BY THE ADVANTAGED STUDENTS, AND OPPORTUNITIES OF THE INCONSISTENT STUDENTS DIFFERED FROM THOSE OF THEIR ASSOCIATED MAJORITY GROUPS. (PS)

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Forest I. Harrison

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This report has been abstracted from a dissertation that is to be submitted to the faculty of the Division of the Social Sciences, Department of Education, The University of Chicago.

## INTRODUCTION

Problem.--Of the students experiencing success in school, it is evident that the majority come from home backgrounds that are advantaged with respect to the expectations held by the schools. These students are advantaged in that they come from homes which provide a "curriculum" that complements the curriculum of the school. The majority of students who are not experiencing success in school come from home backgrounds that are generally disadvantaged with respect to school expectations. These students are disadvantaged in that they have not had those experiences which are prerequisite to a successful school performance. The generalizations of Bloom, et al. (3), based upon extensive research findings, provided the support for these contentions.

There are some students, though few in number, whose school performances and home backgrounds are inconsistent with the pattern described above. Inconsistent with the successful school performance associated with the advantaged home conditions, there are students from advantaged home backgrounds who are not experiencing success in school. Also, there are students from disadvantaged home backgrounds who are experiencing success in school, an outcome which is inconsistent with that generally associated with a disadvantaged home background.

The presence of the inconsistent students is evident in the research which has dealt with the relationship between home background and school performance. Bloom, et al. (3), after an extensive survey of the literature, stated that most of the studies dealing with this relationship revealed significant (positive) correlations on the order of .30 to .50 between sociological indices of home background and measures of school achievement. An explanation for the amount of variance which remains unexplained is the presence of the inconsistent students. Even though the inconsistent students have appeared as an aberrant phenomenon in our research dealing with the relationship between home background and school success, a survey of the literature revealed that we have done very little to try to understand why they exist. To account for this phenomenon, our understanding of these students has to be broadened. In doing so, it is important to know in what ways, besides school performance, the inconsistent students differ from their associated majority group.

In this present investigation, the characteristics selected for study were specific attitudes of the students and estimates of their educational opportunities. It is known from previous research that attitudes are a function of the effects of home conditions, and it is also known that they are related to school performance. In the work by Deutsch (8), it was stated that, even though psychologists have long recognized the intimate relationship existing between internalized attitudes and individual learning and functioning, attitudes have distinctive characteristics related to environmental conditions and group membership. Asch (2) has stated that there is clear evidence of highly homogeneous views within given sociological groupings and of equally definitive differences between them.

Understandably, if students are to succeed in school, they must be provided with an opportunity to do so. There are two primary sources for such opportunities; one is the home, and the other is the school. The maximum educational opportunity is afforded the student when opportunities come from both the home and the school. If the parents cannot provide the initial and supportive intellective training, then, as Bloom, et al., (3) have said, the school is the logical social agency to do it. The recent findings of the U. S. Office of Education study (16) by Coleman, et al., clearly point up the importance of both the home and the school in providing for educational opportunity.

An awareness of these issues led to the formulation of the problem of this investigation. To what extent can the aberrant phenomenon of the inconsistent student be explained by analyzing the differences in the attitudes and educational opportunities of inconsistent students in relation to those of the consistent students? In this study, the inconsistent students were those who could be classified as either advantaged-nonsuccessful or disadvantaged-successful. The consistent students were those who could be classified as either advantaged-successful or disadvantaged-nonsuccessful. Both the inconsistent students and the consistent students were considered as pure types for the purposes of this study. A pure type is defined as a student who possesses certain criterion characteristics and, hence, one who can qualify as a member of a pure group.

Hypotheses.--The study of attitudes in this investigation was conceived as an inquiry into the nature of a social system involving the student, his home background, and the school. In establishing the theoretical framework for the study of attitudes, the model of social behavior formulated by Getzels (10) was used. This model of a social system deals with the interrelationships among cultural values, institutional expectations, and individual motives. The components of the model include the values of the culture in which the individual has been socialized, the values of the culture which serves as the context for the institution, the institutional expectations, and the internalized motives of the individuals. For the purposes of this study, the values of the culture in which the student has been socialized are the values of either the advantaged culture or the disadvantaged culture. The values of these cultures are estimated in this study by the attitudes of the consistent students. The values of the culture which serves as the context for the institution are the values of the dominant, advantaged culture. Both Getzels (10) and Charters (5) have stated that the cultural values of the school are those of the majority middle class. Also, for the purposes of this study, the expectations of the institution are the expectations of the schools, and the internalized motives of the individual are the attitudes of the students. Attitude, as the term is used in this study, and as it has been used by Charters and Gage (6, p. 334), is "an enduring, learned predisposition to behave in a consistent way toward a given class of objects." Internalized attitudes operate as motives within the personality of the student.

Getzels (11) has given consideration to the interrelationships among cultural values, institutional expectations, and individual motives for both the majority middle-class child and minority lower-class child, termed, respectively, in this study, as the advantaged student and the disadvantaged student. He has postulated these interrelationships in terms of the conceptual model. A summary statement of these propositions is given here.

The values of the advantaged culture, the culture which serves as the context for the institution, and the expectations of the institution tend to be congruent. For all advantaged students, the values in the culture which serves as the context for the institution, the advantaged culture, and the values

in the culture within which the students have been socialized tend to be congruent. For the advantaged students who are successful in school, the expectations of the institution and the internalized motives of the students tend to be congruent, and the internalized motives of the students and the values of the advantaged culture within which they were socialized also tend to be congruent.

In this system the values of his culture are internalized by the advantaged student through the process of socialization, and they become motives within the personality of the student in the form of attitudes. The expectations of the institution for this student are defined by the school in relation to the values in the culture of the student. For the advantaged student, these conditions can, and most often do, provide for preferred behavior, and this preferred behavior can, and most often does, result in a successful school performance.

For all disadvantaged students, the values in the culture which serves as the context for the institution, the advantaged culture, and the values in the culture within which the students have been socialized tend to be incongruent. For the disadvantaged students who are not experiencing success in school, the expectations of the institution and the internalized motives of the students tend to be incongruent, but the values of the disadvantaged culture within which they were socialized and the internalized motives of the students tend to be congruent.

The situation of the disadvantaged student, then, is such that the values that are available during socialization are not the same as those which are in evidence in the dominant advantaged culture. Consequently, the values available during socialization are not those which serve as the context for the institutional expectations. These conditions are such that the disadvantaged student does not, and usually cannot, experience success in school.

Using the propositions of Getzels which were stated above, other propositions were derived to make explicit the hypothetical interrelationships among cultural values, student motives and institutional expectations for the inconsistent student types.

For the advantaged students who are not experiencing success in school, the expectations of the institution

and the internalized motives of the students tend to be incongruent, and the internalized motives of the students and the values of the advantaged culture within which they were socialized also tend to be incongruent.

For these advantaged-nonsuccessful students, their lack of success is reflected in an incongruency between their motives and the expectations of the school. Since the values of the advantaged culture are congruent with the expectations of the schools, we can expect the attitudes of these students to differ, to some extent, at least, from the attitudes found in the advantaged culture.

For the disadvantaged students who are experiencing success in school, the expectations of the institution and the internalized motives of the students tend to be congruent, but the internalized motives of the individuals and the values of the disadvantaged culture within which they were socialized tend to be incongruent.

For these disadvantaged-successful students, their success in school is reflected in the congruency between their motives and the expectations of the school. Because the values of the disadvantaged are not, in general, congruent with the expectations of the schools, we can expect to find that the attitudes of these students differ from the attitudes found in the disadvantaged culture.

In concluding this discussion of the theoretical framework of the study of attitudes, the proposition basic to the inconsistent students is given further consideration because it was used as a basis for formulating the hypotheses which dealt with the attitudes of the students. It was postulated that the attitudes of the advantaged-nonsuccessful students would be incongruent with those of their associated majority group, the advantaged-successful students, and that the attitudes of the disadvantaged-successful students would be incongruent with those of their associated majority group, the disadvantaged-nonsuccessful students. The basic proposition, referred to throughout this report, is that the attitudes of the inconsistent students tend to be incongruent with those of their associated majority group.

The attitudes under investigation were classified

into three categories. The category into which an attitude was placed depended upon the environmental conditions which were thought to be primary in influencing the development of that attitude. The environmental conditions that were considered were (1) the home, (2) the home as well as the school, and (3) the school. This categorization resulted in three hypotheses which dealt with the attitudes of the students.

The first hypothesis dealt with the attitude toward man and his environment, the attitude which was thought to have been primarily influenced in its development by early socialization in the home. The generalizations of Bloom, et al., (3) and of others provided support for this belief. The possibility of modification of this attitude by influences in the school was not precluded, however. This attitude dimension was measured on a continuous scale. A representative item selected from the scale is: "Almost every present human problem will be solved in the future." Agreement with this statement and similar statements indicated a tendency toward the attitude that man could gain some mastery of his environment, and disagreement indicated a tendency toward the attitude that man is at the mercy of his environment.

The first hypothesis dealt with the attitude toward man and his environment. It is briefly stated as follows: First, the attitudes of the advantaged students will differ from the attitudes of the disadvantaged students. Secondly, the attitudes of the inconsistent students will differ from those of their associated majority group.

The analysis and results of the test of this hypothesis and the other hypotheses are presented later in this report.

The second hypothesis dealt with the attitude toward school and school learning, the one attitude whose development was thought to have been the result of conditions in the home and of influences in the school setting. This belief was supported by the work of Sewell (14) and Evans (9). This attitudinal dimension was measured on a continuous scale. A representative item which was selected from this scale is: "I dislike school and will quit just as soon as possible." Agreement with this statement and similar statements indicated a tendency toward the attitude

that school and school learning are not important, and disagreement indicated a tendency toward the attitude that schooling is important.

The second hypothesis dealt with the attitude toward school and school learning. It is briefly stated as follows: First, the attitudes of the advantaged students will differ from those of the disadvantaged students, and, secondly, the attitudes of the successful students will differ from those of the nonsuccessful students. Moreover, the attitudes of the inconsistent students will differ from those of their associated majority group.

The third hypothesis dealt with the set of attitudes whose development was thought to have been primarily the result of influences in the school setting and, in particular, of the influences of success or failure in mathematics. All of the attitudes in the set dealt with the nature of mathematics, which is a school-related as well as a subject-related topic. The three attitudes were: the attitude toward the place of mathematics in society, the attitude toward the difficulty in learning mathematics, and the attitude toward mathematics as a process.

One item taken from the scale used to measure the attitude toward the place of mathematics in society is: "Mathematics is of great importance to a country's development." Agreement with this statement and similar statements indicated a tendency toward the attitude that mathematics occupies an important place in society, and disagreement indicated a tendency toward the attitude that mathematics is neither essential nor useful. One item from the scale used to measure the attitude toward difficulty in learning mathematics is: "Only people with a special talent can learn mathematics." Disagreement with this statement and similar statements indicated a tendency toward the attitude that mathematics is a subject which can be learned by many, not just by an elitist few, and agreement indicated a tendency toward the attitude that mathematics can only be learned by the specially talented. One item taken from the scale used to measure the attitude toward mathematics as a process is: "Mathematics will change rapidly in the near future." Agreement with this statement and similar statements indicated a tendency toward the attitude that mathematics is a subject still in the process of development, and disagreement

indicated a tendency toward the attitude that mathematics is a fixed and rigid subject.

The third hypothesis dealt with the three school-related attitudes. It is briefly stated as follows: the attitudes of the successful students will differ from the attitudes of the nonsuccessful students.

In addition to the study of attitudes, a study of the educational opportunities of the students was undertaken. Several estimates of educational opportunity were used because it was not expected that any one estimate would reveal the exact nature and extent of the students' opportunities, but it was expected that the overall pattern which resulted would contribute to the understanding of the opportunities. If the schools do intervene in the process of the development of inconsistent students, we can expect to find that their opportunities differ from those of their associated majority group.

The opportunity to learn the expectations of the institutions of the advantaged culture constitutes an educational opportunity. If the disadvantaged are not given the opportunity to learn these expectations, they cannot possibly satisfy them. This contention is supported in part in the U. S. Office of Education study (13) by Coleman, et al. One way for disadvantaged students to obtain this opportunity is for them to attend schools where students from advantaged backgrounds create an advantaged social climate. The hypotheses, then, which dealt with educational opportunity were grouped as to whether they dealt with the social class climate within the school or whether they dealt with the specifics of the school program.

The social class climate within a school and its relationship to school performance have been studied by others. Coleman (7) has shown that educational institutions differ with respect to social class climate and that these differences can affect values, attitudes, and other behaviors. His research has demonstrated that the social class climate of the entire student body can have its impact on the performance of the students within the school.

Social class climate was estimated by selected measures of the socio-economic status of the students within a school. It was a school characteristic

which was assigned to each of the pure types selected from that school. The differences which were of interest were not differences between schools, but differences between pure groups.

The fourth hypothesis, the one hypothesis which dealt with the social class climate in the schools, is briefly stated as follows: the successful students will differ from the nonsuccessful students with respect to their social class climate characteristics.

The remaining two hypotheses dealt with the school program as an aspect of educational opportunity. Understandably, the essence of educational opportunity lies in the program which is offered by the schools. The term, school program, as it is used in this study, is meant to encompass that which the student perceives as well as that which the school is, in actuality, offering. Two characteristics of the school program used as estimates of the students' educational opportunities were the students' perceptions of their mathematics teaching and of their school and school learning. The students were asked to report on their educational environment as they perceived it. This technique of student reporting is a procedure which has been advanced in the work of Pace and Stern (13). The two descriptive measures which were used were an attempt to measure these environmental dimensions on continuous scales.

One item taken from the description of mathematics teaching scale is: "My mathematics teacher wants us to discover mathematical principles and ideas for ourselves." Agreement with this statement and similar statements indicated that the student viewed the mathematics teaching as directed toward stimulating students, and disagreement indicated that the student viewed the mathematics teaching as directed toward rote memorization. One item taken from the description of school and school learning scale is: "Most of our classroom work is listening to the teacher." Disagreement with this statement and similar statements indicated that the student viewed school learning as inquiry-centered, and agreement indicated that the student viewed school learning as authoritarian-centered.

Previous research which has dealt with these environmental dimensions has revealed no definitive generalizations with respect to the approach to learning

which should be taken if learning is to be facilitated. Anderson (1), in reviewing authoritarian-democratic studies, concluded that it was still impossible to demonstrate that either of the two styles is more closely associated with success. Stern (15) has stated that cognitive gain is largely unaffected by whether teaching is directive or nondirective. Yet, if the school does intervene in the process of development, the teachers' and schools' approaches to learning might very well differentially influence student types.

The fifth hypothesis, which dealt with the students' descriptions of their mathematics teaching and school and school learning is briefly stated as follows: the perceptions of the successful students will differ from those of the nonsuccessful students.

The final hypothesis also dealt with the nature of the school program. In this hypothesis, however, the program which was actually offered by the schools was studied rather than the students' perceptions of the school programs. Selected measures of the school program were used to estimate the educational opportunity afforded the students. These measures included the teachers' ratings of the students' opportunities to learn all the items of the mathematics achievement test, the type of school in which the student was enrolled, and the kinds of educational differentiation which were practiced in the school.

The sixth and final hypothesis which was formulated follows: the educational opportunities of the successful students will differ from those of the nonsuccessful students. The differences in educational opportunities between the advantaged students and the disadvantaged students were also to be investigated, however.

The findings of the tests of each of these hypotheses are presented in a later section of this report.

## METHOD

In the search for pure types such as those required for this study, large numbers of students must be made available so that a sufficient number of students who satisfy the specific criteria for pure group membership can be found. The data bank of the

International Project for the Evaluation of Educational Achievement, described by Husen, et al., (12) represents such a pool of students. This data bank was used as the data source for this investigation because it provided a source for students who satisfied the criteria of pure student types and, furthermore, because the data which was available on these students was relevant to the problem posed in this study. The data included information on the experiences and environments of the students, their interests and attitudes, and their measured school achievement. Information was available in the bank on nearly 30,000 thirteen-year-old students from ten countries. Students from eight countries were used in this study because sufficient numbers of pure types could not be found in two of the countries. Thirteen-year-olds were selected for study because it was thought that the effects of home background and the effects of school performance on attitudes would be most evident in this age group.

Several instruments had been used to collect information in the formation of the data bank. The instruments which were used are mentioned here, so that the nature of the data used in this study will be better understood. Student, teacher, and school questionnaires were used in collecting background information. Achievement tests in mathematics were developed and used to measure cognitive outcomes. A teacher rating scale was also used in which the mathematics teachers of the students rated each of the items of the achievement test with respect to the opportunity their students had been given to learn that type of mathematical competence. An opinionnaire was used in assessing the students' attitudes and their descriptions of their school environments. The specifics of these instruments are given at those points in the report where they are needed.

The initial step in resolving the problem posed in this study was to select the pure student types for the investigation. At the very outset, decisions had to be made as to the criteria which would be used in the selection process, the variables and their combinations which would be used in specifying group membership, and the cutoff points for the criteria for pure group membership.

It was decided that, as estimates of the student's

home background, the parents' educational levels and the status of the father's occupation, in combination, would be used. The parents' educational levels were the number of years of education completed by each parent, and the status of father's occupation was secured from a coded occupational scale.* The work of Warner, et al., (17) among other works, attests to the significance of these status characteristics as estimates of home background.

As indices of school success, it was decided that mathematics achievement and interest in mathematics, again in combination, would be used. Mathematics achievement and interest in mathematics are clearly only gross estimates of overall school performance, but the use of a data bank imposes limiting conditions. The mathematics achievement level of a student was his corrected score on the mathematics achievement test. The variable, interest in mathematics, was an index which was derived from the information obtained on the student questionnaire. The questions which were used in constructing this index were drawn from those which dealt with the student's preference for mathematics.**

To assure that only pure types were selected, only those students who were from either a most advantaged home background or a most disadvantaged home background were chosen. Moreover, these students were included only if they could be further characterized as being either quite successful or unsuccessful in their performance in school.

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*The possible range of father's and mother's educations was from one year of school completed through 24 years completed. The four highest status occupational classes and the codes which were used to represent them were: (1) professionals, (2) administrators and executives, (3) technicians, and (4) sales personnel. The three lowest status occupational classes and the codes which were used to represent them were: (5) skilled workers, (6) laborers, and (7) unskilled manual workers. Seven classes in total were used.

**The range of possible scores on the mathematics achievement test was from 0.25 to 70.00. The interest index was an eleven point scale. The students were given points only for mathematics-related responses.

The primary sample for testing the hypotheses and deriving the major generalizations of this study was selected from the representative sample of students in the United States. A total of 678 students was finally selected for the primary sample from the 5,110 students who were available in the original pool in the United States. To assure that the conclusions which were reached were based upon the study of a sufficient number of students, approximately 100 students were sought for each of the two inconsistent groups. For the primary sample, the advantaged students who were selected were those students both of whose parents had at least thirteen years of education and whose fathers were in the four highest status occupational classes. The disadvantaged students were those students whose parents had only ten years of education or less and whose fathers were in the three lowest status occupational classes. Within the advantaged group and the disadvantaged group, the successful students who were selected were those students who achieved a total mathematics score that was 16.25 or higher and a score of 7 or more on the interest in mathematics index. Again within each group, the nonsuccessful students who were selected were those students who had a mathematics achievement score of 16.00 or less and also a score of no more than 6 on the interest index. This information is summarized in Table 1 along with the number of students selected in each of the four groups.

Once the primary sample had been selected, pure types were selected from the representative samples in the seven other countries and an extended sample in the United States. These additional samples were selected to further explore the generalizations which were reached using the primary sample. The extended sample from the United States was used to determine the extent to which the conclusions which were reached would apply to an extended population. For this extended sample, the cutoff points for the educational levels of both parents of the advantaged students were lowered, and the cutoff points for the educational levels of both parents of the disadvantaged students were raised. Thus, many more students were selected for this extended sample than were selected for the primary sample. The students in the primary sample were replaced before the extended sample was selected.

TABLE 1

CRITERIA CUTOFF POINTS AND PURE GROUP SIZES
FOR THE PRIMARY SAMPLE

| GROUP | N | FATHER'S EDUCATION | MOTHER'S EDUCATION | STATUS OF FATHER'S OCCUPATION | MATHEMATICS ACHIEVEMENT SCORE | INTEREST IN MATHEMATICS SCORE |
|---|---|---|---|---|---|---|
| Advantaged-Successful | 283 | 13 years or more | 13 years or more | 4 or lower | 16.25 or higher | 7 or higher |
| Advantaged-Nonsuccessful | 94 | 13 years or more | 13 years or more | 4 or lower | 16.00 or lower | 6 or lower |
| Disadvantaged-Successful | 89 | 10 years or less | 10 years or less | 5 or higher | 16.25 or higher | 7 or higher |
| Disadvantaged-Nonsuccessful | 212 | 10 years or less | 10 years or less | 5 or higher | 16.00 or lower | 6 or lower |

In selecting the students from the other countries, the cutoff points for the criteria had to be adjusted from country to country. It was not possible to use common cutoff points when selecting students from all countries. The criteria for group membership and the cutoff points which were used in establishing the four pure groups for the other countries and the extended sample in the United States are given in Table 11 in the Appendix. The number in each of the four groups within each country is also presented.

Statistically, the hypotheses in the study of attitudes and the study of educational opportunities were tested using an analysis of variance and, where appropriate, a multivariate analysis of variance. The methods used were those developed by Bock (4). In the design of the study, home background (either advantaged or disadvantaged) was crossed with school performance (either successful or nonsuccessful). Unbiased estimates of these effects were made. Multiple comparisons were made, descriptive statistics were calculated, and summary information was compiled as they were needed.

## RESULTS

The results of the tests of the hypotheses of the study of attitudes and of the study of educational opportunities are presented here. Given first are the results of the tests of the hypotheses which dealt with the attitudes of the students. Before testing the first hypothesis, the hypothesis which dealt with the student's attitude toward man and his environment, descriptive statistics were calculated. The mean scores on this attitude and the standard deviations which were calculated for each group in the primary sample are presented in Table 2.* In the test of the first hypothesis, the advantaged students, those who were advantaged-successful and those who were advantaged-nonsuccessful were found

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*The range of possible scores on this attitude was from a low of 0 to a high of 18. A score which exceeded 9 indicated a tendency toward the attitude that man can gain control of his environment, and a score below 9 indicated a tendency toward the attitude that man can only hope to secure some measure of adjustment to his environment.

TABLE 2

GROUP STATISTICS ON THE ATTITUDE
TOWARD MAN AND HIS ENVIRONMENT

| | GROUP | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| | ADVANTAGED SUCCESSFUL | | ADVANTAGED NONSUCCESSFUL | | DISADVANTAGED SUCCESSFUL | | DISADVANTAGED NONSUCCESSFUL | |
| ATTITUDE | $\bar{X}$ | SD | $\bar{X}$ | SD | $\bar{X}$ | SD | $\bar{X}$ | SD |
| Toward Man and His Environment | 6.86 | 2.11 | 7.81 | 2.28 | 7.72 | 2.69 | 8.54 | 2.50 |

to differ significantly in their attitudes from those of the disadvantaged students, those who were disadvantaged-successful and disadvantaged-nonsuccessful. The univariate F for the effect of home background equaled 15.43, p less than .01 with 1/674 df. This finding supported the first part of the first hypothesis. The attitudes of the successful students, those who were advantaged-successful and those who were disadvantaged-successful, were found to differ significantly from the attitudes of the nonsuccessful students, those who were advantaged-nonsuccessful and those who were disadvantaged-nonsuccessful. The univariate F for the effect of school performance equaled 19.26, p less than .01 with 1/674 df. Multiple comparisons revealed that the differences in attitudes between the inconsistent students and their associated majority groups were, in fact, significant differences. A 95 per cent confidence interval was used in making these comparisons. These findings supported the second part of the first hypothesis.

A supplementary finding was that the advantaged-successful students tended more toward the attitude that man can only hope to secure a measure of adjustment to his environment than did the disadvantaged-nonsuccessful students. None of the four groups expressed extreme attitudes, however. This trend can be seen in the group means presented in Table 2.

When the first hypothesis was tested using the samples from the seven other countries and the extended sample from the United States, the attitudes toward man and his environment of the inconsistent students were found to be incongruent with the attitudes of their associated majority groups in countries A, B, C, D, E, G, and the extended sample in the United States. The group statistics for the additional samples are presented in Table 12 in the Appendix.

Group descriptive statistics were calculated as an initial step toward the test of the second hypothesis, the one which dealt with the attitude toward school and school learning. The mean scores on this attitude and the standard deviations which were calculated for each group in the primary sample are presented in Table 3.*

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*The range of possible scores on this attitude was from a low of 0 to a high of 22. The higher the score, the greater the tendency toward the attitude that schooling is important.

TABLE 3

GROUP STATISTICS ON THE ATTITUDE TOWARD SCHOOL AND SCHOOL LEARNING

| | GROUP | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| | ADVANTAGED SUCCESSFUL | | ADVANTAGED NONSUCCESSFUL | | DISADVANTAGED SUCCESSFUL | | DISADVANTAGED NONSUCCESSFUL | |
| ATTITUDE | $\bar{X}$ | SD | $\bar{X}$ | SD | $\bar{X}$ | SD | $\bar{X}$ | SD |
| Toward School and School Learning | 7.78 | 1.73 | 8.44 | 2.17 | 8.38 | 1.74 | 8.60 | 2.07 |

In the test of this hypothesis, the advantaged students differed significantly in their attitudes toward school and school learning from the disadvantaged students. The univariate F equaled 5.39, p less than .05 with 1/674 df. Also, the attitudes of the successful students differed significantly from the attitudes of the nonsuccessful students. The univariate F equaled 7.32, p less than .01 with 1/674 df. When multiple comparisons were made, it was found that the attitudes of the advantaged-nonsuccessful students did differ significantly from those of the advantaged-successful students. On the other hand, the differences between the attitudes of the disadvantaged-successful students and the disadvantaged-nonsuccessful students were found to be nonsignificant. A 95 per cent confidence interval was used in making these comparisons. These findings contributed to the support of the second hypothesis.

Additionally, it was found that the disadvantaged-nonsuccessful students tended more toward the attitude that schooling is important than did the advantaged-successful students. Even though none of the four groups expressed extreme attitudes, the trends can be seen in the group means presented in Table 3.

When the second hypothesis was tested using the additional samples, the attitudes toward school and school learning of the inconsistent students were found to be incongruent with those of their associated majority groups in countries A, B, C, E, F, and the extended sample in the United States. The group statistics for these additional samples are presented in Table 13 of the Appendix.

In consideration of the third hypothesis, the one which dealt with the three subject-related attitudes, mean scores on each of these attitudes and the standard deviations for each of the groups are given in Table 4.*

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*The range of possible scores on the attitude toward the place of mathematics in society was from a low of 0 to a high of 18, the range on the attitude toward difficulty in learning mathematics was from a low of 0 to a high of 14, and the range on the attitude toward mathematics as a process was from a low of 0 to a high of 16. These attitudes were scored in the same manner as the two attitudes previously discussed.

TABLE 4

GROUP STATISTICS ON THE THREE SCHOOL RELATED ATTITUDES

| | GROUP | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| | ADVANTAGED SUCCESSFUL | | ADVANTAGED NONSUCCESSFUL | | DISADVANTAGED SUCCESSFUL | | DISADVANTAGED NONSUCCESSFUL | |
| ATTITUDE | $\bar{X}$ | SD | $\bar{X}$ | SD | $\bar{X}$ | SD | $\bar{X}$ | SD |
| Toward Place of Math in Society | 8.68 | 2.24 | 8.69 | 2.10 | 8.35 | 2.07 | 8.61 | 2.08 |
| Toward the Difficulties of Learning Math | 9.38 | 1.61 | 9.37 | 1.77 | 9.67 | 1.51 | 9.56 | 1.68 |
| Toward Math as a Process | 8.10 | 2.31 | 8.18 | 2.12 | 7.64 | 1.96 | 8.04 | 2.08 |

The effect of school performance was found to be a nonsignificant effect in a multivariate test where the three subject-related attitudes were treated as a multivariate set. The effect of home background was also found to be a nonsignificant effect. These results did not support the third hypothesis in that the subject-related attitudes of all four pure groups in the primary sample were found to be congruent.

When the third hypothesis was tested using the samples from the seven other countries and the extended sample from the United States, the school-related attitudes were found to differentiate, in general, the successful students from the nonsuccessful students in countries B, C, D, E, F, and G. Group statistics for each country are presented in Table 14 of the Appendix.

This concludes the presentation of the results of the study of attitudes. The findings of the study of educational opportunities follow.

In the test of the fourth hypothesis, six characteristics were used to estimate the social class climates of the schools of the pure types. These characteristics were three means and three standard deviations calculated on all the students who were tested in the schools from which the pure types were selected. These means and standard deviations were then assigned to the pure type selected from that school as six of his characteristics. Hence, the unit of analysis was the student, not the school.

The six social climate characteristics which were used included: variability (standard deviation) of father's education, mean of father's education, variability (standard deviation) of mother's education, mean of mother's education, variability (standard deviation) of status of father's occupation, and mean of status of father's occupation.* Those character-

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*Nine occupational classes were used in creating the two measures which dealt with father's occupation. The occupational classes and the classification codes which were used were: (1) professionals, (2) administrators and executives, (3) technicians, (4) small working proprietors, (5) managers in agriculture, forestry, and fishing, (6) sales personnel, (7) skilled workers, (8) laborers, and (9) unskilled manual laborers.

istics which dealt with parents' educations were treated as one multivariate set, and those which dealt with status of father's occupation were treated as another.

The group descriptive statistics for those characteristics which dealt with parents' educations are presented in Table 5. In the test of the fourth hypothesis, the two social climate characteristics, mean of father's education and mean of mother's education, were significantly higher for the advantaged-successful students than for the advantaged-nonsuccessful students. In the interaction effect of home background and school performance, the univariate *F* for the mean of father's education equaled 5.80, p less than .05 with 1/674 df; the univariate *F* for the mean of mother's education equaled 4.39, p less than .01 with 1/674 df. These same two characteristics were significantly higher for the advantaged students than for the disadvantaged students, and, furthermore, the characteristics of the variability of both parents' educations were significantly higher for the disadvantaged students than for the advantaged students. The multivariate *F* for these four characteristics equaled 114.56, p less than .01 with 4/671 df. These findings did not add to the support of the fourth hypothesis.

When the fourth hypothesis was tested using the additional samples, all four characteristics which dealt with parents' educations were higher for the successful students than for the nonsuccessful students in countries A, B, C, E, and F. For countries D, G, and the extended sample in the United States, the finding was that the mean of father's education and mean of mother's education were significantly higher for the successful students than for the nonsuccessful students. In countries A, B, C, D, F, and G, all four characteristics which dealt with parents' educations were higher for the advantaged students than for the disadvantaged students. In the extended sample in the United States, it was found that the variability of father's education and variability of mother's education were greater for the disadvantaged students than for the advantaged students, but the means on father's education and mother's education were higher for the advantaged students than for the disadvantaged students. Group descriptive statistics for each country on these four social class characteristics are presented in Table 15 in the Appendix.

TABLE 5

DESCRIPTIVE STATISTICS ON SELECTED SOCIAL CLIMATE CHARACTERISTICS: PARENTS' EDUCATIONS

| CHARACTERISTIC | GROUP | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| | ADVANTAGED SUCCESSFUL | | ADVANTAGED NONSUCCESSFUL | | DISADVANTAGED SUCCESSFUL | | DISADVANTAGED NONSUCCESSFUL | |
| | $\bar{X}$ | SD | $\bar{X}$ | SD | $\bar{X}$ | SD | $\bar{X}$ | SD |
| Variability of Father's Education | 4.67 | 0.74 | 4.68 | 0.65 | 4.86 | 0.93 | 4.87 | 0.77 |
| Mean of Father's Education | 13.44 | 1.60 | 12.88 | 1.64 | 9.97 | 1.84 | 10.11 | 1.77 |
| Variability of Mother's Education | 4.45 | 0.66 | 4.50 | 0.65 | 4.58 | 0.78 | 4.68 | 0.71 |
| Mean of Mother's Education | 12.99 | 1.23 | 12.54 | 1.34 | 10.31 | 1.64 | 10.38 | 1.65 |

The group descriptive statistics on the two social climate characteristics, variability of status of father's occupation and mean of status of father's occupation, are presented in Table 6. In a further test of the fourth hypothesis, the mean of status of father's occupation was found to be significantly lower for the advantaged-successful students than for the advantaged-nonsuccessful students. (Remember, the higher the status of the occupation the lower the numerical code assigned to that occupation.) The univariate F for the interaction of home background and school performance equaled 6.39, p less than .05 with 1/674 df. Also, this same characteristic was significantly lower for the advantaged students than for the disadvantaged students. The univariate F for the home background effect equaled 275.20, p less than .01 with 1/674 df. These findings also did not add support to the hypothesis.

The variability of status of father's occupation was found to be greater for the successful students than for the nonsuccessful students in countries A, B, C, E, and F in a further test of the fourth hypothesis using the additional samples. In these same countries, the mean of status of father's occupation was lower for the successful students than for the nonsuccessful students. (Again, the higher the status of the occupation the lower the numerical code assigned to that occupation.) In the extended sample in the United States, the mean of status of father's occupation was lower for the successful students than for the nonsuccessful students. In countries A, B, C, D, F, G, and the extended sample from the United States, the variability of status of father's occupation was greater for the advantaged students than for the disadvantaged students, and the mean of status of father's occupation was lower for the advantaged than for the disadvantaged students. Group descriptive statistics on these two social class characteristics in each country are presented in Table 16 in the Appendix. This concludes the presentation of the results of the fourth hypothesis.

The fifth hypothesis was one of the two hypotheses which dealt with the nature of the school program as one aspect of educational opportunity. The variables used to test this hypothesis were the students' descriptions of their mathematics teaching and their school and school learning, two estimates of the educational setting. The descriptive statistics on

TABLE 6

DESCRIPTIVE STATISTICS ON SELECTED
SOCIAL CLIMATE CHARACTERISTICS:
FATHER'S OCCUPATION

| | GROUP | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| | ADVANTAGED SUCCESSFUL | | ADVANTAGED NONSUCCESSFUL | | DISADVANTAGED SUCCESSFUL | | DISADVANTAGED NONSUCCESSFUL | |
| CHARACTERISTIC | X | SD | X | SD | X | SD | X | SD |
| Variability of Status of Father's Occupation | 2.26 | 0.48 | 2.28 | 0.50 | 2.11 | 0.69 | 2.22 | 0.74 |
| Mean of Status of Father's Occupation | 3.87 | 1.08 | 4.22 | 1.11 | 5.50 | 0.86 | 5.42 | 0.84 |

these variables for each group in the primary sample are presented in Table 7.*

In the test of the fifth hypothesis, the primary differences of interest were between the successful students and the nonsuccessful students. The effect of school performance, however, was found to be a nonsignificant effect. Moreover, when the differences between the advantaged students and the disadvantaged students were tested,they were also found to be nonsignificant. All four pure groups tended to describe their educational settings, as measured by these two variables, in much the same way. The fifth hypothesis was not supported by these findings.

When this fifth hypothesis was tested using the additional samples, it was found that all four groups within each country described their mathematics teaching and school and school learning in similar manners in countries B, D, E, G, and the extended sample in the United States. In country F, the advantaged students tended to describe their school and school learning as more inquiry-centered than did the disadvantaged students. Group descriptive statistics on these two student descriptions for each country are given in Table 17 in the Appendix.

The students' opportunity to learn the items on the mathematics test, type of school, and educational differentiation. were the three variables used in testing the sixth hypothesis, the second hypothesis which dealt with the nature of the school program. Group descriptive statistics on the students' opportunities to learn the items on the mathematics test

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*The range of possible scores on the students' description of their mathematics teaching scale was from a low of 0, indicating that their mathematics teaching was directed toward rote memorization, to a high of 22, indicating that their mathematics teaching was directed toward stimulating students. The range of possible scores on the students' description of their school and school learning scale was from a low of 0, indicating that the school learning was authoritarian-centered, to a high of 22, indicating that their school learning was inquiry-centered.

TABLE 7

GROUP STATISTICS ON THE TWO DESCRIPTIVE SCALES

| | GROUP | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| | ADVANTAGED SUCCESSFUL | | ADVANTAGED NONSUCCESSFUL | | DISADVANTAGED SUCCESSFUL | | DISADVANTAGED NONSUCCESSFUL | |
| DESCRIPTION OF | $\bar{X}$ | SD | $\bar{X}$ | SD | $\bar{X}$ | SD | $\bar{X}$ | SD |
| Mathematics Teaching | 13.42 | 2.62 | 13.32 | 2.84 | 13.75 | 2.25 | 13.75 | 2.63 |
| School and School Learning | 10.37 | 2.71 | 10.29 | 2.72 | 9.67 | 2.58 | 10.36 | 2.63 |

are presented in Table 8.* In the test of this final hypothesis, the opportunities for the students to learn the mathematics items were found to be greater for the successful students than for the nonsuccessful students. The univariate F equaled 18.51, p less than .01 with 1/674 df. The advantaged students had been given a greater opportunity to learn the mathematics items than the disadvantaged students. The univariate F equaled 27.34 for the effect of home background, p less than .01 with 1/674 df. Multiple comparisons were made, and it was found that the opportunities of the inconsistent students differed significantly from those of their associated majority groups. A 95 percent confidence interval was used in these comparisons. Both groups of inconsistent students had been given the opportunity to learn about 50% of the items on the mathematics test. The hypothesis, as it was stated, was supported by these findings.

In the test of the sixth hypothesis using the samples from the other countries and the extended sample from the United States, it was found that the successful students were given a greater opportunity to learn the items of the mathematics test than were the nonsuccessful students in countries B, C, E, F, and the extended sample in the United States. In the one country, country D, where this finding was not supported, it was found that all four groups had been given an equal opportunity to learn the items of the mathematics test. The group statistics for these additional samples on the students' opportunity to learn the items on the mathematics achievement test are presented in Table 18 in the Appendix.

Group statistics, in the form of percentages, for the remaining two estimates of the school program, type of school and educational differentiation, are presented in Tables 9 and 10, respectively. No statis-

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*This measure of opportunity was a rating by the student's mathematics teacher as to the opportunity which he had been given to learn the items on the mathematics achievement test. Each item of the test was rated by his teacher and an average "opportunity score" was calculated for each student. Opportunity was measured as a percentage. The range of possible scores on this scale was from a low of 12.5% opportunity to a high 87.5% opportunity.

TABLE 8

GROUP STATISTICS ON THE STUDENT'S OPPORTUNITY TO LEARN THE MATHEMATICS ITEMS

| | GROUP | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| | ADVANTAGED SUCCESSFUL | | ADVANTAGED NONSUCCESSFUL | | DISADVANTAGED SUCCESSFUL | | DISADVANTAGED NONSUCCESSFUL | |
| VARIABLE | X | SD | X | SD | X | SD | X | SD |
| Opportunity for Students to Learn All Items | 54.66 | 13.71 | 50.68 | 14.48 | 49.73 | 12.98 | 44.71 | 11.74 |

TABLE 9

THE PERCENTAGE OF STUDENTS WITHIN GROUP AND TYPE OF SCHOOL (STUDENTS WITH MISSING DATA IGNORED)

| TYPE OF SCHOOL | GROUP | | | |
|---|---|---|---|---|
| | ADVANTAGED SUCCESSFUL N=272 | ADVANTAGED NONSUCCESSFUL N=94 | DISADVANTAGED SUCCESSFUL N=87 | DISADVANTAGED NONSUCCESSFUL N=207 |
| Comprehensive | 88.65 | 87.23 | 94.25 | 97.10 |
| Selective-Academic | 8.87 | 8.51 | 2.30 | 0.00 |
| Selective-Vocational | 0.71 | 1.06 | 0.00 | 0.00 |
| Remainder | 1.77 | 3.20 | 3.45 | 2.90 |

TABLE 10

THE PERCENTAGE OF STUDENTS WITHIN GROUP AND TYPE OF EDUCATIONAL DIFFERENTIATION, IF ANY (STUDENTS WITH MISSING DATA IGNORED)

| | GROUP | | | |
|---|---|---|---|---|
| DIFFERENTIATION | ADVANTAGED SUCCESSFUL N = 275 | ADVANTAGED NONSUCCESSFUL N = 91 | DISADVANTAGED SUCCESSFUL N = 86 | DISADVANTAGED NONSUCCESSFUL N = 200 |
| Universally Practiced | 33.09 | 38.46 | 38.38 | 32.00 |
| Generally Practiced | 40.00 | 40.67 | 33.72 | 31.00 |
| Some Age or Grade Group Only | 22.54 | 14.28 | 18.60 | 19.00 |
| Not at all | 4.37 | 6.59 | 9.30 | 18.00 |

tical tests were made on these descriptive statistics; only trends were observed. A higher percentage of successful students than nonsuccessful students was found to be enrolled in schools which characterized themselves primarily as selective-academic schools. (See Table 9.) Moreover, none of the disadvantaged-nonsuccessful students were found to be enrolled in the selective-academic type of school. A few of the disadvantaged-successful students (2.3%) were enrolled in these kinds of schools. The practice of educational differentiation was more prevalent for the advantaged-successful students than for the advantaged-nonsuccessful students, and, moreover, it was more prevalent for the disadvantaged-successful students than for the disadvantaged-nonsuccessful students. (See Table 10.) Finally, the practice of educational differentiation was more prevalent for the advantaged students than for the disadvantaged students.

The sixth hypothesis was not tested using these two variables in any of the additional samples. This concludes the presentation of the results of this investigation.

## DISCUSSION

In interpreting the results, specific attention is directed toward the major findings of both the study of the attitudes of the students and the study of their educational opportunities. These major findings are discussed in that order.

The general attitudes, the attitude toward man and his environment and the attitude toward school and school learning, of the inconsistent students were found to be incongruent with those of their associated majority group. This finding was supported in the majority of the countries studied. The subject-related attitudes of the inconsistent students in the United States were found to be congruent with those of their associated majority group. In the majority of the other countries studied, however, these attitudes of the inconsistent students were found to be incongruent with those of their associated majority group. One plausible explanation for this result is that, in the homes and in the schools of the students in the United States, subject-related attitudes are not given an emphasis. Hence, we find little or no association between these attitudes and home background or school performance. On

the other hand, in the other countries which were studied, it may be that these attitudes are emphasized both in the homes and in the schools.

An unanticipated finding was that, where differences in attitudes were observed between pure types, the disadvantaged-nonsuccessful students tended toward more "positive" attitudes than did the advantaged-successful students. None of the pure groups, however, expressed extreme positions on any of the attitudes which were studied. We must wait until we know conclusively which attitudes are held by particular pure types before a satisfactory explanation can be offered for this result. This knowledge depends on further research on the pure group phenomenon.

The conclusions which were reached as the result of the study of attitudes are presented in a subsequent section of this report.

In the study of educational opportunities, the social class climate characteristics of the advantaged-successful students differed from those of any of the other groups. While there were differences between the advantaged students and the disadvantaged students and also between the successful and the nonsuccessful students, the evidence indicated that the social class climates in the schools of the advantaged-successful students were generally more advantaged than those climates in the schools of any of the other groups. Any conclusions which are drawn from this evidence must be limited because differences between students were tested, not differences between schools. Schools cannot be characterized as "successful"or "nonsuccessful".

Another finding was that the students' perceptions of their educational settings did not differentiate the four pure types from one another. This evidence along with the conclusion of Stern (15) suggest that the students' perceptions of their mathematics teaching and school and school learning are not related to their performance in school. Even though the schools may say that they are offering differential instructional strategies to their students, the pure groups studied did not perceive these differences.

When the nature of the school program was estimated using selected characteristics, differences were found between the successful students and the non-

successful students. The nonsuccessful students had not been given the same opportunities that were given to the successful students, and, moreover, the disadvantaged students had not been given the same opportunity as had been given to the advantaged students.

The conclusions of this study which are presented in the following section are limited in that, in many cases, gross estimates of the variables involved were used. In particular, status characteristics were used to estimate processes occurring in the home, performance in school was estimated by achievement and interest in mathematics, and educational opportunities were estimated by various gross estimates. Also, only one age group, thirteen-year-olds, was studied. The conclusions which follow should be considered with respect to these qualifications.

## CONCLUSIONS, IMPLICATIONS, AND RECOMMENDATIONS

The results of this investigation have brought us closer to the explanation for the aberrant phenomenon of the inconsistent students. In the study of attitudes, student characteristics which distinguished pure groups from one another and characteristics which were shared by the pure groups were identified. In the study of educational opportunities, opportunities which distinguished pure groups as well as opportunities which they had in common were identified.

A major conclusion in the study of attitudes was that the attitudes of the inconsistent students differ from those of their associated majority group. In that this proposition was derived from a theoretical framework, the conceptual framework of Getzels (11), the empirical verification of the basic proposition adds to the verification of this conceptual framework. Thus, educational theory had been advanced as a result of this investigation.

A second conclusion reached as a result of this empirical investigation was that attitudes, home background, and school performance are interdependent. One cannot be separated from the others. The schools in the countries which were studied need to be reminded again of the interrelationships between attitudes, home culture, and performance in school. The evidence collected in this investigation suggests that the schools are engaged in attitude formation whether this is explicitly included as an objective of the school program or not.

Additional research is needed to determine the specific reasons for the differences in attitudes which have been identified between the inconsistent students and their associated majority group. We also need to know what can be done and we need to decide what, if anything, should be done for these special cases, the inconsistent students.

In the study of educational opportunities, the conclusions which were reached were that: (1) the nonsuccessful students had not been given the educational opportunities which were afforded the successful students, (2) the disadvantaged students had not been given the opportunities which were afforded the advantaged students, and (3) the opportunities of the inconsistent students differed from those of their associated majority group. These conclusions have decided implications for practices in the schools in all the countries which were studied. If we want all students to be successful students, the opportunities which were afforded the advantaged-successful students should be offered to all other students. While the possibility remains that not all students will be able to benefit from these opportunities, these opportunities should be offered to all if success in school is valued. The opportunity to attend those schools which are characteristic of the schools which the advantaged-successful students are attending should be given to all students. Similar conclusions have been reached by Bloom, et al., (3) and in the U. S. Office of Education study (16) by Coleman, et al.

A final conclusion reached was that isolation and identification of characteristics which contribute to the explanation of the aberrant phenomenon of the inconsistent students were made possible through pure group methodology. In future studies where differences in selected characteristics are of interest, the use of pure group methodology could contribute to the significance of the results of these investigations.

Basic research needs to be undertaken to identify variables which reflect the processes which are occurring in the schools and in the homes. Before an explanation for the existence of the inconsistent students can be completed, we need to know what processes are occurring in the homes of the advantaged as well as the disadvantaged students and in the schools.

## SUMMARY

Problem and hypotheses.--The problem that was posed for study was: to what extent can the aberrant phenomenon of the inconsistent students be explained in an analysis of the differences in the attitudes and educational opportunities of inconsistent students in relation to those of the consistent students? The inconsistent students of this study were those who could be classified as either students from advantaged home backgrounds who were nonsuccessful in their school performances or students from disadvantaged home backgrounds who were successful in their school performances. Their associated consistent majority groups were those students who could be classified as either advantaged-successful or disadvantaged-nonsuccessful, respectively.

The theoretical framework of Getzels (11) was used in deriving a basic proposition which resulted in the major hypothesis concerning the attitudes of the students. Namely, the attitudes of the inconsistent students are incongruent with those of their associated majority group. General attitudes, such as the attitude toward man and his environment, and school-related attitudes, such as the attitude toward mathematics as a process, were studied.

In investigating the students' educational opportunities, the major hypothesis was that the educational opportunities of the successful students are different from those of the nonsuccessful students. It is implied in this hypothesis that the educational opportunities of the inconsistent students are different from those of their associated majority group. The several estimates of educational opportunity included estimates of the social class climate in the schools and estimates of the nature of the school program such as students' descriptions of their educational settings and students' opportunities to learn the content covered in a mathematics achievement test.

Method.--In selecting the samples to be studied, only those students who were from either a most advantaged home background or a most disadvantaged home background were chosen. Moreover, these students were included only if they could be further characterized as being either quite successful or nonsuccessful in their school performances. That is, pure types were sought for membership in pure groups.

Status characteristics of the students' parents were used in estimating home background, and achievement and interest in mathematics were used as criteria for performance in school. The primary sample of this investigation was selected from a representative sample of thirteen-year-old students in the United States. Similar samples were selected from representative samples in seven other countries. The source of data for this study was the data bank of the International Project on the Evaluation of Educational Achievement, in Husen, et al. (12). Comparisons were made between the advantaged students and the disadvantaged students, between the successful students and the nonsuccessful students, and between the inconsistent students and the consistent students on their attitudes and educational opportunities.

Results and conclusions.--The general and subject-related attitudes of the inconsistent students were found to differ from those of their associated majority group. This finding was an empirical verification of the basic proposition which was derived from the theoretical framework of Getzels (11). This result has contributed to the advancement of educational theory. Additionally, the findings demonstrated that attitudes, home background, and school performance are interdependent.

The conclusions which were reached as a result of the study of educational opportunities were: the nonsuccessful students had not been given the opportunities which were afforded the successful students, the disadvantaged students had not been given the opportunities which were afforded the advantaged students, and the opportunities of the inconsistent students differed from those of their associated majority group. These conclusions suggest implications for educational practices in all the countries studied. The opportunities which were afforded the advantaged-successful students were not offered to all students. Yet, if success for all students in school is valued, such opportunities should be offered to all.

Attitudes which distinguish one pure group from another and attitudes which are shared by the pure groups were identified in this study. Thus, our understanding of the aberrant phenomenon of the inconsistent students has been increased. Additionally, some of the opportunities which distinguish the pure groups from one another and opportunities which they have in common have now been identified.

Before the explanation for the existence of the inconsistent students can be offered, those processes which are occurring in the homes and in the schools which influence the development of attitudes and other student characteristics need to be identified.

REFERENCES


1. Anderson, R. C. "Learning in Discussions: A Resume of the Authoritarian-Democratic Studies," Harvard Educational Review. XXIX, 1959. p. 201-215.

2. Asch, Solomon E. Social Psychology. Englewood Cliffs, New Jersey: Prentice-Hall, Inc. 1952.

3. Bloom, Benjamin S.; Davis, Allison; and Hess, Robert. Compensatory Education for Cultural Deprivation. New York: Holt, Rinehart and Winston, Inc. 1965.

4. Bock, R. Darrell. "Programming Univariate and Multivariate Analysis of Variance," Technometrics. V, 1963. p. 95-117.

5. Charters, W. W., Jr. "The Social Background of Teaching," Handbook of Research on Teaching. Edited by N. L. Gage. Chicago: Rand McNally & Company. 1963. p. 715-813.

6. Charters, W. W., Jr., and Gage, N. L. (Eds.) Readings in the Social Psychology of Education. Boston: Allyn and Bacon, Inc. 1963. p. 309-318.

7. Coleman, James S. "The Adolescent Subculture and Academic Achievement," The American Journal of Sociology. LXV, 1960. p. 337-347.

8. Deutsch, Martin. Minority Group and Class Status as Related to Social and Personality Factors in Scholastic Achievement. The Society for Applied Anthropology, Monograph Number 2. Cornell University, Ithaca, New York: New York State School of Industrial and Labor Relations, 1960.

9. Evans, K. M. Attitudes and Interests in Education. London: Routledge and Kegan Paul. 1965.

10. Getzels, Jacob W. "Conflict and Role Behavior in the Educational Setting," Readings in the Social Psychology of Education. Edited by W. W. Charters and N. L. Gage. Boston: Allyn and Bacon, Inc. 1963. p. 309-318.

11. Getzels, Jacob W. A Social Psychology of Education. Chicago: The University of Chicago. 1966. Mimeographed.

12. Husen, T., et al. International Project for the Evaluation of Educational Achievement, Phase I: A Comparative Study of Outcomes of Mathematics Instruction in Twelve Countries, Volume I and Volume II. In press.

13. Pace, C. R., and Stern, G. G. "An Approach to the Measurement of Psychological Characteristics of College Environments," Journal of Educational Psychology. XLIX. p. 269-277.

14. Sewell, William H.; Haller, Archie O.; and Straus, Murray A. "Social Status and Educational and Occupational Aspiration," American Sociological Review. XXII, 1957. p. 66-73.

15. Stern, George G. "Measuring Noncognitive Variables in Research on Teaching," Handbook of Research on Teaching. Edited by N. L. Gage. Chicago: Rand, McNally & Company. 1963. p. 398-447.

16. U. S. Department of Health, Education, and Welfare, Office of Education. Equality of Educational Opportunity. U. S. Government Printing Office, OE-38000, 1966.

17. Warner, W. Lloyd; Meeker, Marchia; and Eells, Kenneth. Social Class in America: A Manual of Procedure for the Measurement of Social Status. New York: Harper & Brothers, 1960.

# APPENDIX

TABLE 11

CRITERIA CUTOFF POINTS AND PURE GROUP SIZES FOR THE SAMPLES IN SEVEN COUNTRIES AND FOR THE SECOND SAMPLE IN THE UNITED STATES

| COUNTRY AND GROUP | N | FATHER'S EDUCATION | MOTHER'S EDUCATION | STATUS OF FATHER'S OCCUPATION | MATHEMATICS ACHIEVEMENT SCORE | INTEREST IN MATHEMATICS SCORE |
|---|---|---|---|---|---|---|
| Country A | | | | | | |
| Advantaged-Successful | 141 | 10 years or more | 10 years or more | 4 or lower | 27.75 or higher | 6 or higher |
| Advantaged-Nonsuccessful | 31 | 10 years or more | 10 years or more | 4 or lower | 27.50 or lower | 5 or lower |
| Disadvantaged-Successful | 106 | 9 years or less | 9 years or less | 5 or higher | 27.75 or higher | 6 or higher |
| Disadvantaged-Nonsuccessful | 97 | 9 years or less | 9 years or less | 5 or higher | 27.50 or lower | 5 or lower |
| Country B | | | | | | |
| Advantaged-Successful | 413 | 10 years or more | 10 years or more | 4 or lower | 19.50 or higher | 6 or higher |
| Advantaged-Nonsuccessful | 37 | 10 years or more | 10 years or more | 4 or lower | 19.25 or lower | 5 or lower |
| Disadvantaged-Successful | 139 | 9 years or less | 9 years or less | 5 or higher | 19.50 or higher | 6 or higher |
| Disadvantaged-Nonsuccessful | 135 | 9 years or less | 9 years or less | 5 or higher | 19.25 or lower | 5 or lower |

TABLE 11 (CONTINUED)

CRITERIA CUTOFF POINTS AND GROUP SIZES FOR THE ADDITIONAL SAMPLES

| COUNTRY AND GROUP | N | FATHER'S EDUCATION | MOTHER'S EDUCATION | STATUS OF FATHER'S OCCUPATION | MATHEMATICS ACHIEVEMENT SCORE | INTEREST IN MATHEMATICS SCORE |
|---|---|---|---|---|---|---|
| Country C | | | | | | |
| Advantaged-Successful | 229 | 8 years or more | 8 years or more | 4 or lower | 18.50 or higher | 6 or higher |
| Advantaged-Nonsuccessful | 79 | 8 years or more | 8 years or more | 4 or lower | 18.25 or lower | 5 or lower |
| Disadvantaged-Successful | 74 | 7 years or less | 7 years or less | 5 or higher | 18.50 or higher | 6 or higher |
| Disadvantaged-Nonsuccessful | 87 | 7 years or less | 7 years or less | 5 or higher | 18.25 or lower | 5 or lower |
| Country D | | | | | | |
| Advantaged-Successful | 150 | 9 years or more | 9 years or more | 4 or lower | 31.25 or higher | 7 or higher |
| Advantaged-Nonsuccessful | 46 | 9 years or more | 9 years or more | 4 or lower | 31.00 or lower | 6 or lower |
| Disadvantaged-Successful | 95 | 8 years or less | 8 years or less | 5 or higher | 31.25 or higher | 7 or higher |
| Disadvantaged-Nonsuccessful | 150 | 8 years or less | 8 years or less | 5 or higher | 31.00 or lower | 6 or lower |

TABLE 11 (CONTINUED)

CRITERIA CUTOFF POINTS AND GROUP SIZES FOR THE ADDITIONAL SAMPLES

| COUNTRY AND GROUP | N | FATHER'S EDUCATION | MOTHER'S EDUCATION | STATUS OF FATHER'S OCCUPATION | MATHEMATICS ACHIEVEMENT SCORE | INTEREST IN MATHEMATICS SCORE |
|---|---|---|---|---|---|---|
| Country E | | | | | | |
| Advantaged-Successful | 397 | 9 years or more | 9 years or more | 4 or lower | 19.25 or higher | 6 or higher |
| Advantaged-Nonsuccessful | 155 | 9 years or more | 9 years or more | 4 or lower | 19.00 or lower | 5 or lower |
| Disadvantaged-Successful | 21 | 8 years or less | 8 years or less | 5 or higher | 19.25 or higher | 6 or higher |
| Disadvantaged-Nonsuccessful | 41 | 8 years or less | 8 years or less | 5 or higher | 19.00 or lower | 5 or lower |
| Country F | | | | | | |
| Advantaged-Successful | 229 | 7 years or more | 7 years or more | 4 or lower | 15.75 or higher | 6 or higher |
| Advantaged-Nonsuccessful | 69 | 7 years or more | 7 years or more | 4 or lower | 15.50 or lower | 5 or lower |
| Disadvantaged-Successful | 120 | 6 years or less | 6 years or less | 5 or higher | 15.75 or higher | 6 or higher |
| Disadvantaged-Nonsuccessful | 103 | 6 years or less | 6 years or less | 5 or higher | 15.50 or lower | 5 or lower |

TABLE 11(CONTINUED)

CRITERIA CUTOFF POINTS AND GROUP SIZES FOR THE ADDITIONAL SAMPLES

| COUNTRY AND GROUP | N | FATHER'S EDUCATION | MOTHER'S EDUCATION | STATUS OF FATHER'S OCCUPATION | MATHEMATICS ACHIEVEMENT SCORE | INTEREST IN MATHEMATICS SCORE |
|---|---|---|---|---|---|---|
| Country G | | | | | | |
| Advantaged-Successful | 91 | 9 years or more | 9 years or more | 4 or | 20.25 or higher | 6 or higher |
| Advantaged-Nonsuccessful | 39 | 9 years or more | 9 years or more | 4 or lower | 20.00 or lower | 5 or lower |
| Disadvantaged-Successful | 34 | 8 years or less | 8 years or less | 5 or higher | 20.24 or higher | 6 or higher |
| Disadvantaged-Nonsuccessful | 58 | 8 years or less | 8 years or less | 5 or higher | 20.00 or lower | 5 or lower |
| United States | | | | | | |
| Advantaged-Successful | 607 | 12 years or more | 12 years or more | 4 or lower | 16.25 or higher | 7 or higher |
| Advantaged-Nonsuccessful | 290 | 12 years or more | 12 years or more | 4 or lower | 16.00 or lower | 6 or lower |
| Disadvantaged-Successful | 138 | 11 years or less | 11 years or less | 5 or higher | 16.25 or higher | 7 or higher |
| Disadvantaged-Nonsuccessful | 256 | 11 years or less | 11 years or less | 5 or higher | 16.00 or lower | 6 or lower |

TABLE 12

GROUP STATISTICS WITHIN EACH COUNTRY ON THE ATTITUDE TOWARD MAN AND HIS ENVIRONMENT

| | GROUP | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| | ADVANTAGED SUCCESSFUL | | ADVANTAGED NONSUCCESSFUL | | DISADVANTAGED SUCCESSFUL | | DISADVANTAGED NONSUCCESSFUL | |
| COUNTRY | $\bar{X}$ | SD | $\bar{X}$ | SD | $\bar{X}$ | SD | $\bar{X}$ | SD |
| A | 8.22 | 2.72 | 8.97 | 2.29 | 8.57 | 2.09 | 8.69 | 2.30 |
| B | 8.19 | 2.48 | 8.89 | 2.94 | 8.25 | 2.21 | 8.97 | 2.20 |
| C | 8.00 | 2.53 | 8.44 | 2.55 | 8.92 | 2.56 | 9.15 | 2.17 |
| D | 8.52 | 1.94 | 9.67 | 2.21 | 9.30 | 1.85 | 9.91 | 1.90 |
| E | 8.03 | 2.39 | 8.81 | 2.55 | 8.19 | 2.48 | 8.80 | 2.68 |
| F | 7.98 | 2.26 | 7.51 | 2.21 | 8.19 | 2.26 | 8.61 | 1.92 |
| G | 7.97 | 2.40 | 8.87 | 2.26 | 8.41 | 2.10 | 9.48 | 2.56 |
| United States | 7.03 | 2.19 | 7.72 | 2.26 | 7.67 | 2.78 | 8.57 | 2.48 |

TABLE 13

GROUP STATISTICS WITHIN EACH COUNTRY ON THE ATTITUDE TOWARD SCHOOL AND SCHOOL LEARNING

| | GROUP | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| | ADVANTAGED SUCCESSFUL | | ADVANTAGED NONSUCCESSFUL | | DISADVANTAGED SUCCESSFUL | | DISADVANTAGED NONSUCCESSFUL | |
| COUNTRY | X | SD | X | SD | X | SD | X | SD |
| A | 9.58 | 1.70 | 9.97 | 2.10 | 9.65 | 1.93 | 10.16 | 2.18 |
| B | 8.71 | 1.72 | 9.22 | 1.70 | 8.94 | 1.79 | 9.66 | 2.14 |
| C | 9.53 | 1.88 | 10.29 | 1.86 | 10.04 | 2.07 | 11.08 | 1.98 |
| D | 10.21 | 1.78 | 9.72 | 1.56 | 10.47 | 1.60 | 10.65 | 1.90 |
| E | 8.69 | 1.77 | 9.47 | 2.27 | 8.71 | 1.65 | 9.44 | 2.09 |
| F | 9.23 | 1.65 | 10.42 | 2.14 | 9.77 | 1.93 | 10.52 | 2.09 |
| G | 8.34 | 1.71 | 9.59 | 1.90 | 9.50 | 2.36 | 8.40 | 2.32 |
| United States | 7.92 | 1.74 | 8.44 | 2.16 | 8.31 | 1.72 | 8.62 | 2.04 |

TABLE 14

GROUP STATISTICS WITHIN EACH COUNTRY ON THE ATTITUDE TOWARD PLACE OF MATHEMATICS IN SOCIETY (APMS), ATTITUDE TOWARD DIFFICULTY LEARNING MATHEMATICS (ADLM), AND ATTITUDE TOWARD MATHEMATICS AS A PROCESS (AMP)

| | | GROUP | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| | | ADVANTAGED SUCCESSFUL | | ADVANTAGED NONSUCCESSFUL | | DISADVANTAGED SUCCESSFUL | | DISADVANTAGED NONSUCCESSFUL | |
| COUNTRY | ATTITUDE | $\bar{X}$ | SD | $\bar{X}$ | SD | $\bar{X}$ | SD | $\bar{X}$ | SD |
| A | APMS | 8.76 | 2.36 | 8.52 | 2.95 | 8.44 | 2.04 | 8.33 | 2.06 |
| | ADLM | 8.90 | 1.79 | 8.84 | 2.00 | 9.14 | 1.69 | 9.01 | 1.91 |
| | AMP | 7.22 | 1.98 | 8.06 | 1.88 | 7.42 | 1.95 | 7.67 | 1.95 |
| B | APMS | 8.28 | 2.34 | 8.60 | 2.42 | 8.73 | 2.13 | 7.84 | 2.19 |
| | ADLM | 9.31 | 1.62 | 9.30 | 1.52 | 9.50 | 1.55 | 9.25 | 1.55 |
| | AMP | 7.68 | 2.33 | 8.60 | 1.85 | 7.96 | 2.18 | 7.92 | 2.24 |
| C | APMS | 10.44 | 2.29 | 9.85 | 2.36 | 10.55 | 2.13 | 9.98 | 2.49 |
| | ADLM | 9.08 | 1.88 | 9.14 | 2.23 | 8.51 | 1.86 | 9.24 | 2.14 |
| | AMP | 7.66 | 2.00 | 8.20 | 1.84 | 8.35 | 1.95 | 8.41 | 1.62 |
| D | APMS | 9.93 | 1.77 | 9.41 | 1.90 | 9.73 | 2.06 | 9.09 | 1.88 |
| | ADLM | 8.55 | 1.24 | 8.35 | 1.40 | 8.43 | 1.36 | 8.34 | 1.45 |
| | AMP | 6.00 | 1.70 | 5.96 | 1.37 | 6.03 | 1.75 | 6.27 | 2.02 |

TABLE 14 (CONTINUED)

GROUP STATISTICS WITHIN EACH COUNTRY ON THE ATTITUDE TOWARD PLACE OF MATHEMATICS IN SOCIETY (APMS), ATTITUDE TOWARD DIFFICULTY LEARNING MATHEMATICS (ADLM), AND ATTITUDE TOWARD MATHEMATICS AS A PROCESS (AMP)

| | | GROUP | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| | | ADVANTAGED SUCCESSFUL | | ADVANTAGED NONSUCCESSFUL | | DISADVANTAGED SUCCESSFUL | | DISADVANTAGED NONSUCCESSFUL | |
| COUNTRY | ATTITUDE | $\bar{X}$ | SD | $\bar{X}$ | SD | $\bar{X}$ | SD | $\bar{X}$ | SD |
| E | APMS | 8.57 | 2.54 | 8.09 | 2.49 | 8.62 | 2.27 | 9.39 | 2.38 |
| | ADLM | 9.32 | 1.72 | 9.31 | 1.86 | 9.57 | 1.60 | 9.49 | 1.94 |
| | AMP | 7.32 | 2.18 | 7.95 | 2.18 | 6.90 | 2.53 | 8.00 | 1.98 |
| F | APMS | 8.99 | 2.24 | 9.01 | 2.07 | 8.82 | 2.33 | 8.88 | 2.30 |
| | ADLM | 9.15 | 1.39 | 8.96 | 1.81 | 9.28 | 1.40 | 8.44 | 1.77 |
| | AMP | 6.69 | 2.10 | 7.80 | 1.76 | 7.31 | 2.00 | 8.16 | 1.91 |
| G | APMS | 8.62 | 2.26 | 8.13 | 2.78 | 8.29 | 2.17 | 8.09 | 2.30 |
| | ADLM | 9.65 | 1.63 | 9.72 | 2.04 | 9.44 | 1.44 | 9.40 | 1.59 |
| | AMP | 7.65 | 2.17 | 8.54 | 2.13 | 7.41 | 2.54 | 8.36 | 2.18 |
| U.S. | APMS | 8.74 | 2.25 | 8.70 | 2.11 | 8.52 | 2.04 | 8.58 | 2.08 |
| | ADLM | 9.36 | 1.64 | 9.27 | 1.79 | 9.62 | 1.52 | 9.54 | 1.68 |
| | AMP | 8.17 | 2.23 | 8.27 | 2.25 | 7.72 | 2.04 | 8.02 | 2.08 |

TABLE 15

GROUP STATISTICS WITHIN EACH COUNTRY ON SELECTED SOCIAL CLIMATE CHARACTERISTICS: PARENTS' EDUCATIONS

| | | GROUP | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| | | ADVANTAGED SUCCESSFUL | | ADVANTAGED NONSUCCESSFUL | | DISADVANTAGED SUCCESSFUL | | DISADVANTAGED NONSUCCESSFUL | |
| COUNTRY | VARIABLE | X | SD | X | SD | X | SD | X | SD |
| A | VFE | 3.49 | .055 | 3.38 | 0.78 | 3.17 | 0.74 | 2.42 | 0.97 |
| | MFE | 11.88 | 1.45 | 11.35 | 1.66 | 10.07 | 1.33 | 9.10 | 1.05 |
| | VME | 2.93 | 0.55 | 2.90 | 0.56 | 2.78 | 0.68 | 2.29 | 0.71 |
| | MME | 10.66 | 1.35 | 10.44 | 1.38 | 9.42 | 1.00 | 8.86 | 0.98 |
| B | VFE | 2.12 | 0.55 | 1.52 | 0.88 | 1.46 | 0.85 | 1.02 | 0.86 |
| | MFE | 11.61 | 1.31 | 10.42 | 0.88 | 10.05 | 0.68 | 9.69 | 0.64 |
| | VME | 1.80 | 0.58 | 1.28 | 0.68 | 1.15 | 0.67 | 0.86 | 0.62 |
| | MME | 11.08 | 1.01 | 10.29 | 0.73 | 9.88 | 0.50 | 9.60 | 0.50 |
| C | VFE | 3.27 | 1.01 | 2.81 | 1.04 | 2.33 | 0.99 | 1.69 | 0.85 |
| | MFE | 10.20 | 1.42 | 9.55 | 1.52 | 7.91 | 1.46 | 7.28 | 1.03 |
| | VME | 2.44 | 0.56 | 2.16 | 0.84 | 1.86 | 0.77 | 1.46 | 0.87 |
| | MME | 9.32 | 1.01 | 8.94 | 1.22 | 7.49 | 1.22 | 7.13 | 0.93 |
| D | VFE | 2.57 | 0.76 | 2.17 | 0.83 | 1.87 | 0.90 | 2.06 | 0.94 |
| | MFE | 9.92 | 1.43 | 9.21 | 1.17 | 8.77 | 1.11 | 8.65 | 1.09 |
| | VME | 1.67 | 0.48 | 1.70 | 0.52 | 1.43 | 0.39 | 1.52 | 0.48 |
| | MME | 8.98 | 0.96 | 8.44 | 0.73 | 8.18 | 0.70 | 8.02 | 0.78 |

TABLE 15 (CONTINUED)

GROUP STATISTICS WITHIN EACH COUNTRY ON THE FOUR SCHOOL CLIMATE CHARACTERISTICS

| | | GROUP | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| | | ADVANTAGED SUCCESSFUL | | ADVANTAGED NONSUCCESSFUL | | DISADVANTAGED SUCCESSFUL | | DISADVANTAGED NONSUCCESSFUL | |
| COUNTRY | VARIABLE | $\bar{X}$ | SD | $\bar{X}$ | SD | $\bar{X}$ | SD | $\bar{X}$ | SD |
| E | VFE | 2.24 | 0.60 | 1.84 | 0.68 | 2.13 | 0.36 | 2.05 | 0.68 |
| | MFE | 10.64 | 0.99 | 9.83 | 0.70 | 9.75 | 0.49 | 9.63 | 0.59 |
| | VME | 1.92 | 0.43 | 1.71 | 0.60 | 1.87 | 0.39 | 1.92 | 0.62 |
| | MME | 10.30 | 0.74 | 9.76 | 0.56 | 9.64 | 0.44 | 9.55 | 0.53 |
| F | VFE | 2.93 | 0.81 | 2.65 | 0.98 | 2.02 | 0.94 | 1.52 | 1.06 |
| | MFE | 8.64 | 1.13 | 8.21 | 1.09 | 7.33 | 0.97 | 6.91 | 0.93 |
| | VME | 2.04 | 0.54 | 1.72 | 0.60 | 1.50 | 0.60 | 1.12 | 0.62 |
| | MME | 7.85 | 0.70 | 7.55 | 0.70 | 7.02 | 0.60 | 6.72 | 0.61 |
| G | VFE | 1.55 | 0.25 | 1.47 | 0.36 | 1.30 | 0.36 | 1.22 | 0.43 |
| | MFE | 9.45 | 0.37 | 9.36 | 0.38 | 9.18 | 0.39 | 8.99 | 0.39 |
| | VME | 1.26 | 0.21 | 1.21 | 0.28 | 1.18 | 0.27 | 1.11 | 0.36 |
| | MME | 9.31 | 0.25 | 9.26 | 0.38 | 9.13 | 0.26 | 9.02 | 0.35 |
| United States | VFE | 2.64 | 0.64 | 2.70 | 0.62 | 2.82 | 0.82 | 2.89 | 0.75 |
| | MFE | 13.09 | 1.57 | 12.51 | 1.49 | 10.25 | 1.83 | 10.19 | 1.71 |
| | VME | 2.36 | 0.62 | 2.47 | 0.68 | 2.54 | 0.73 | 2.67 | 0.69 |
| | MME | 12.72 | 1.18 | 12.28 | 1.16 | 10.56 | 1.53 | 10.47 | 1.57 |

TABLE 16

GROUP STATISTICS WITHIN EACH COUNTRY ON SELECTED SOCIAL CLIMATE CHARACTERISTICS: FATHER'S OCCUPATION

| | | GROUP | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| | | ADVANTAGED SUCCESSFUL | | ADVANTAGED NONSUCCESSFUL | | DISADVANTAGED SUCCESSFUL | | DISADVANTAGED NONSUCCESSFUL | |
| COUNTRY | VARIABLE | $\bar{X}$ | SD | $\bar{X}$ | SD | $\bar{X}$ | SD | $\bar{X}$ | SD |
| A | VSFO | 2.04 | 0.24 | 1.90 | 0.30 | 1.96 | 0.30 | 1.60 | 0.44 |
| | MSFO | 4.77 | 0.75 | 5.04 | 0.76 | 5.65 | 0.71 | 6.14 | 0.60 |
| B | VSFO | 1.96 | 0.42 | 1.81 | 0.50 | 1.74 | 0.62 | 1.41 | 0.75 |
| | MSFO | 4.25 | 1.13 | 5.34 | 1.07 | 5.74 | 0.85 | 6.32 | 0.67 |
| C | VSFO | 2.08 | 0.28 | 2.05 | 0.39 | 1.79 | 0.54 | 1.79 | 0.64 |
| | MSFO | 4.62 | 0.76 | 4.94 | 0.92 | 5.85 | 0.81 | 6.03 | 0.74 |
| D | VSFO | 2.08 | 0.49 | 2.03 | 0.53 | 1.90 | 0.45 | 2.04 | 0.62 |
| | MSFO | 4.48 | 0.81 | 4.68 | 0.66 | 5.22 | 0.74 | 5.10 | 0.84 |
| E | VSFO | 2.30 | 0.21 | 2.19 | 0.41 | 2.18 | 0.18 | 2.08 | 0.36 |
| | MSFO | 5.10 | 0.65 | 5.79 | 0.89 | 5.81 | 0.41 | 6.12 | 0.28 |
| F | VSFO | 2.27 | 0.30 | 2.23 | 0.29 | 2.01 | 0.40 | 1.91 | 0.49 |
| | MSFO | 4.88 | 0.64 | 5.12 | 0.69 | 5.47 | 0.68 | 5.77 | 0.64 |
| G | VSFO | 2.22 | 0.28 | 2.08 | 0.38 | 2.07 | 0.39 | 1.95 | 0.46 |
| | MSFO | 5.20 | 0.44 | 5.29 | 0.67 | 5.56 | 0.47 | 5.74 | 0.57 |
| United States | VSFO | 2.27 | 0.43 | 2.31 | 0.48 | 2.15 | 0.62 | 2.23 | 0.70 |
| | MSFO | 4.08 | 1.03 | 4.37 | 1.02 | 5.38 | 0.84 | 5.40 | 0.80 |

TABLE 17

GROUP STATISTICS WITHIN EACH COUNTRY ON THE TWO STUDENT DESCRIPTIVE SCALES, DESCRIPTION OF MATHEMATICS TEACHING (DMT) AND DESCRIPTION OF SCHOOL AND SCHOOL LEARNING (DSSL) (COUNTRIES WITH INCOMPLETE INFORMATION WERE EXCLUDED FROM THE ANALYSIS)

| | | GROUP | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| | | ADVANTAGED SUCCESSFUL | | ADVANTAGED NONSUCCESSFUL | | DISADVANTAGED SUCCESSFUL | | DISADVANTAGED NONSUCCESSFUL | |
| COUNTRY | SCALE | $\bar{X}$ | SD | $\bar{X}$ | SD | $\bar{X}$ | SD | $\bar{X}$ | SD |
| B | DMT | 13.82 | 2.25 | 13.76 | 2.37 | 13.69 | 2.56 | 13.42 | 2.77 |
| | DSSL | 10.51 | 2.78 | 10.22 | 2.08 | 10.67 | 2.72 | 10.57 | 2.42 |
| D | DMT | 14.51 | 2.28 | 13.50 | 2.73 | 14.03 | 2.40 | 13.71 | 2.61 |
| | DSSL | 10.89 | 2.23 | 11.00 | 2.11 | 10.98 | 2.27 | 10.75 | 2.23 |
| E | DMT | 13.99 | 2.42 | 13.76 | 2.69 | 13.52 | 2.25 | 13.12 | 3.04 |
| | DSSL | 10.16 | 2.73 | 9.81 | 2.78 | 10.62 | 2.82 | 9.17 | 3.05 |
| F | DMT | 13.09 | 2.78 | 13.03 | 2.31 | 13.12 | 2.67 | 12.26 | 2.73 |
| | DSSL | 11.07 | 2.43 | 10.94 | 2.57 | 10.51 | 2.23 | 10.12 | 2.69 |
| G | DMT | 13.46 | 2.70 | 13.54 | 2.56 | 13.26 | 2.30 | 12.81 | 2.74 |
| | DSSL | 10.84 | 2.77 | 10.56 | 3.45 | 9.82 | 2.04 | 10.62 | 2.54 |
| United States | DMT | 13.50 | 2.57 | 13.39 | 2.64 | 13.80 | 2.22 | 13.64 | 2.76 |
| | DSSL | 10.39 | 2.74 | 10.43 | 2.69 | 9.78 | 2.63 | 10.34 | 2.68 |

TABLE 17

GROUP STATISTICS WITHIN EACH COUNTRY ON THE TWO STUDENT DESCRIPTIVE SCALES, DESCRIPTION OF MATHEMATICS TEACHING (DMT) AND DESCRIPTION OF SCHOOL AND SCHOOL LEARNING (DSSL) (COUNTRIES WITH INCOMPLETE INFORMATION WERE EXCLUDED FROM THE ANALYSIS)

| | | GROUP | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| | | ADVANTAGED SUCCESSFUL | | ADVANTAGED NONSUCCESSFUL | | DISADVANTAGED SUCCESSFUL | | DISADVANTAGED NONSUCCESSFUL | |
| COUNTRY | SCALE | $\bar{X}$ | SD | $\bar{X}$ | SD | $\bar{X}$ | SD | $\bar{X}$ | SD |
| B | DMT | 13.82 | 2.25 | 13.76 | 2.37 | 13.69 | 2.56 | 13.42 | 2.77 |
| | DSSL | 10.51 | 2.78 | 10.22 | 2.08 | 10.67 | 2.72 | 10.57 | 2.42 |
| D | DMT | 14.51 | 2.28 | 13.50 | 2.73 | 14.03 | 2.40 | 13.71 | 2.61 |
| | DSSL | 10.89 | 2.23 | 11.00 | 2.11 | 10.98 | 2.27 | 10.75 | 2.23 |
| E | DMT | 13.99 | 2.42 | 13.76 | 2.69 | 13.52 | 2.25 | 13.12 | 3.04 |
| | DSSL | 10.16 | 2.73 | 9.81 | 2.78 | 10.62 | 2.82 | 9.17 | 3.05 |
| F | DMT | 13.09 | 2.78 | 13.03 | 2.31 | 13.12 | 2.67 | 12.26 | 2.73 |
| | DSSL | 11.07 | 2.43 | 10.94 | 2.57 | 10.51 | 2.23 | 10.12 | 2.69 |
| G | DMT | 13.46 | 2.70 | 13.54 | 2.56 | 13.26 | 2.30 | 12.81 | 2.74 |
| | DSSL | 10.84 | 2.77 | 10.56 | 3.45 | 9.82 | 2.04 | 10.62 | 2.54 |
| United States | DMT | 13.90 | 2.57 | 13.39 | 2.64 | 13.80 | 2.22 | 13.64 | 2.76 |
| | DSSL | 10.39 | 2.74 | 10.43 | 2.69 | 9.78 | 2.63 | 10.34 | 2.68 |

TABLE 18

GROUP STATISTICS WITHIN EACH COUNTRY ON THE STUDENT'S OPPORTUNITY TO LEARN THE MATHEMATICS ITEMS (COUNTRIES WITH INCOMPLETE INFORMATION WERE EXCLUDED FROM THE ANALYSIS)

| | GROUP | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| | ADVANTAGED SUCCESSFUL | | ADVANTAGED NONSUCCESSFUL | | DISADVANTAGED SUCCESSFUL | | DISADVANTAGED NONSUCCESSFUL | |
| COUNTRY | $\bar{X}$ | SD | $\bar{X}$ | SD | $\bar{X}$ | SD | $\bar{X}$ | SD |
| B | 70.46 | 9.03 | 56.87 | 18.86 | 61.84 | 14.38 | 47.68 | 17.97 |
| C | 60.00 | 12.31 | 54.53 | 12.99 | 48.16 | 9.67 | 43.12 | 8.48 |
| D | 63.04 | 5.54 | 62.90 | 6.93 | 63.67 | 6.09 | 63.58 | 6.06 |
| E | 66.96 | 9.09 | 45.85 | 13.50 | 59.51 | 11.41 | 44.53 | 15.16 |
| F | 39.57 | 8.49 | 37.57 | 8.38 | 38.94 | 9.48 | 37.44 | 9.62 |
| United States | 52.99 | 13.66 | 49.46 | 13.43 | 49.91 | 12.47 | 45.35 | 12.11 |